

ABSTRACT OF THE DISCLOSURE

Oscillation and other disturbance damping is provided for a system having a load driven by an electric motor, e.g., an electromagnetic actuator. Damping is achieved using feedback in an active mode, where power is supplied in a normal operation mode of the electromagnetic actuator. Feedback may be provided by measured force (or torque) transmitted between the actuator and load mass. A gear train or other mechanical advantage device may be connected between the electromagnetic actuator output and load, this combination forming an electromechanical actuator (EMA). Instead of force or torque, acceleration of the load may be used as a feedback signal. In one embodiment, active mode damping uses the motor's actual current as a feedback signal. In certain or all active damping versions of the invention, a high pass filter is preferably used to receive feedback signals and filter out low frequency feedback. Alternatively, damping is achieved in an inactive (passive) mode of motor operation, e.g., where the electric motor is not receiving power drive signals. The motor coils are shorted, e.g., using a switch. The induced motor currents act to inhibit load oscillations. Preferably, a resistance, e.g., a number of resistors, are in the short circuit to tailor the damping characteristics of the motor. In at least the active current feedback and passive modes of operation, inertia of the electric motor is substantially reduced in relation to typical motor inertia, by changing the stator to rotor diameter ratio from a typical ratio of at or about 2:1 or less, to a substantially higher ratio than 2:1.